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China Crop Environment Brief: 1977
Fourth Report, September 1977

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GC CEB 77-005
September 1977

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FOREWORD

This is the fourth in a series of China Crop Environment Briefs which are being prepared to assist in the refinement of crop production estimates of the Peoples Republic of China. These all-source experimental analyses will be produced monthly through early December 1977. Additional ad hoc briefs will be prepared as warranted by developments. The scope and format of the briefs may vary according to the nature of conditions reported and the perceived utility of the findings.

Within the CIA, cooperative efforts of the Environment and Resource Analysis Center (ERAC) of the Office of Geographic and Cartographic Research and the China Division of the Office of Economic Research facilitated the preparation of this brief. In addition, informal consultations were held with the Foreign Agricultural Service, U.S. Department of Agriculture. The brief was written by a multidisciplinary team housed in ERAC -- composed of personnel from both CIA organizations -- representing the disciplines of geography, economics, agronomy, and meteorology.

METHODOLOGY

All intelligence sources -- [redacted] 25X1D
25X1D [redacted] meteorological data as well as traditional sources such as human intelligence reporting, translations, and the open literature -- are being exploited to produce integrated crop environment analyses. The combination of methodologies used is evolving and will be refined and expanded as experience is accumulated and new data inputs become available. A more complete statement of the methodologies employed will be published later.

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KEY POINTS

Environmental conditions in most of China during August appeared generally favorable for crops except in some areas affected by excessive moisture or flooding. The accumulative effects of wet weather cannot yet be determined, however, and crop conditions may not be as good as they now appear.

Excessive rainfall, extended periods of cloudiness, and lower than normal temperatures predominated over extensive areas throughout China during this growing season.

Above-normal rainfall has been generally beneficial in Northeast China.

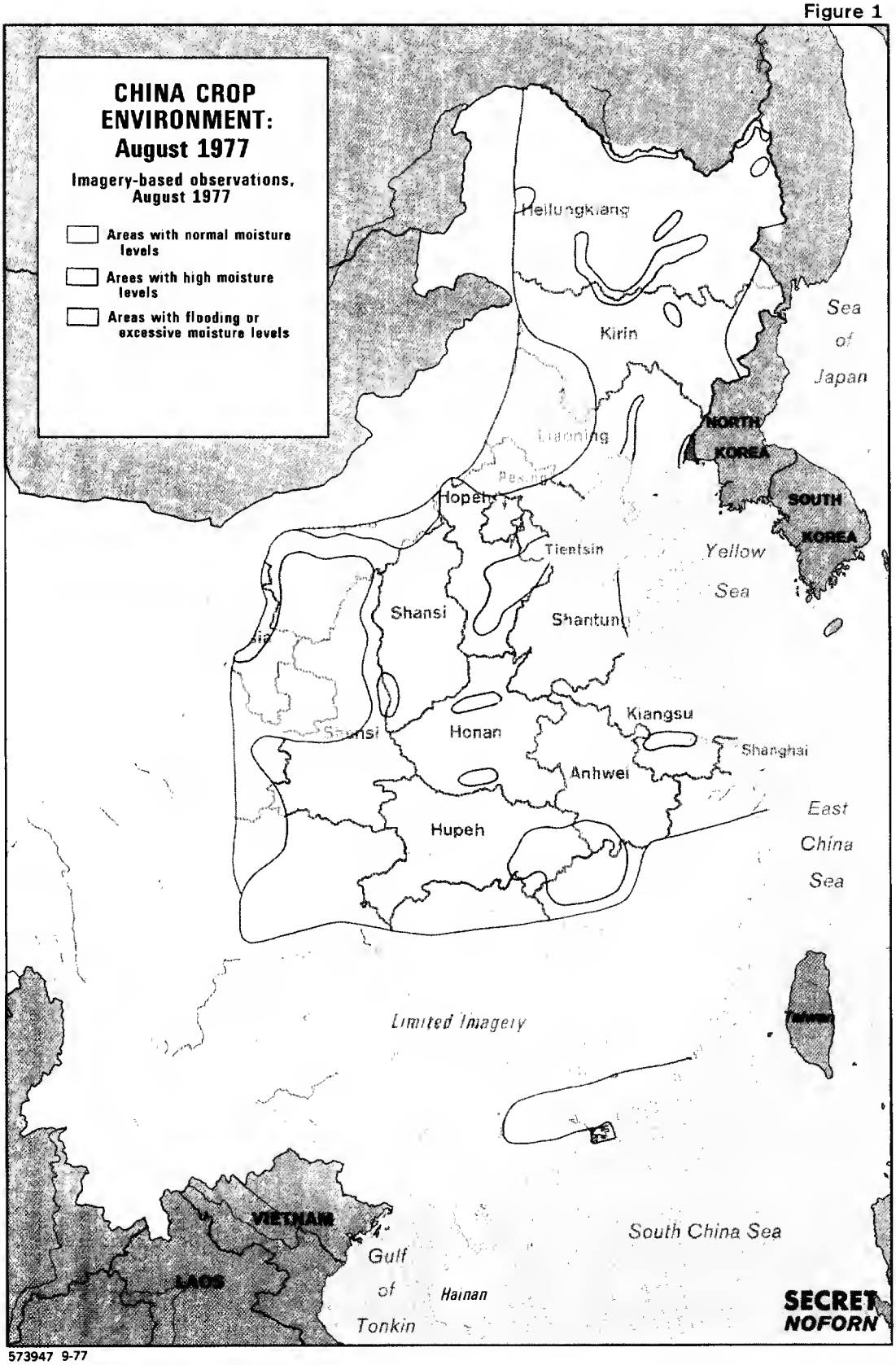
Extensive flooding and soil waterlogging was observed in the North China Plain.

Only limited imagery and other reporting were available for large areas of South and Southwest China.

NOTE: This paper was produced by the Office of Geographic and Cartographic Research. Comments and questions may be directed to [redacted] *Code 143, Extension 2097.*

25X1A

Figure 1



DETAILS

Environmental conditions in the PRC [redacted] in August appeared generally favorable for crops except in those areas affected by excessive moisture or flooding (figure 1); environmental problems noted while interpreting LANDSAT imagery, however, pose questions as to the degree of validity of this "favorable" evaluation. These problems, discussed below, cannot be solved at this stage of the growing season. 25X1D

Most of China's agricultural land has had above-normal precipitation during the growing season, with many areas receiving more than 150 percent of average rainfall between 1 April and 31 July 1977 (figures 2 and 5 and appendix A). Low-lying areas along watercourses observed showed high moisture levels during August, and there were some areas with excessive moisture levels or flooding (figure 1). Flooding -- resulting in damaged or lost crops -- was observable only along some of the major water courses because the low resolution of LANDSAT imagery precludes determination of precise conditions in small areas. The extent of the reported above-normal precipitation shown in figure 2 suggests that flooding and excessive moisture levels existed in areas that were either obscured by cloud cover or not covered by imagery.

The apparently favorable crop environmental conditions throughout much of China in August might, however, not be as favorable as indicated by the infrared returns. The above-normal water conditions that occurred during the growing season could favor excessive vegetative growth and, therefore, be detrimental to grain yield and tuber development. Furthermore, temperatures generally have been below normal in most provinces since May (appendix B). Prolonged periods of rain, with their concomitant reduced sunlight and lower temperatures, promote rapid leaf growth, which gives a high infrared return. The quality and quantity of grain and tubers could be reduced when more of the plants' energy is expended in the production of vegetative growth, especially leaves, and less in the production of grain or tubers. Under conditions of excess moisture and cloudiness, excessive weed growth, if not controlled, could develop and reduce crop nutrition levels; many of the more common plant diseases thrive under these same conditions. Also, plant maturity could be delayed, which in turn could delay plantings of successive crops or subject the late-maturing crop to frost damage. In light of these factors, the apparently favorable conditions [redacted] might not prove to be so favorable where the quality and quantity of grain and tubers could be reduced by excessive moisture. 25X1D

The high level of infrared reflectance indicates excellent growing conditions in the Northeast, well above those during the same period last year (figure 3). Flooding [redacted] 25X1D in low-lying areas along major water courses. Earlier, [redacted] 25X1C considerable amounts of standing water in low-lying areas, with many drainage ditches filled, in east central Liaoning Province during the first week of August. 25X1C Rainfall amounts throughout most of the Northeast returned to near or below normal during the first half of August, and little rain fell during the latter half of the month. Reduced yields and crop losses can be expected in areas that received excessive moisture during the growing season, but higher yields are probable from well drained fields and from those at higher elevations that normally receive low to marginal precipitation.

Excessive moisture levels or flooding were observed over extensive areas in southern Tientsin, northwestern Shantung, and southern Hopeh Provinces in the first part of August; wet conditions also were observed in the Peking area on 8 August, where, except for some lodging, damage was not severe. Large areas -- some as large as 600 square kilometers -- were under water in southern Hopeh (see figure 4). Lower yields can also be expected in other parts of Hopeh and Tientsin because of excessive summer rainfall. Several reports [redacted] 25X1C tell of crop damage and water problems experienced over extensive areas in Hopeh Province. In eastern Hopeh some flooding was observed in the northern coastal area on 27 July and again during the first week of August. On 31 July an extensive area in southwestern Hopeh was flooded to depths as great as 60 centimeters, causing considerable damage to corn and kaoliang, although crops on higher ground were growing well; by 4 August conditions had 25X1C worsened. [redacted] extensive flooding in central Hopeh on 7 August, with two or three villages under water.

The unfavorable crop conditions reported in July in North China for portions of Shantung, Shansi, Honan, and northern Anhwei Provinces now appear to be improved. In this case, [redacted] 25X1C 25X1C [redacted] in late July and early August of low-level flooding and waterlogging in northern Honan also pose questions of interpretation of the good infra-red returns. Again, some yield reductions and crop losses should be expected because of the wet growing season -- especially in areas of excessive moisture along the Yellow River (figure 1). In southwestern Shantung, southern Hopeh, and northern Honan, Anhwei and Kiangsu Provinces rainfall amounts returned to near normal during the middle of August and were well below normal by the end of the month. Rainfall continued to be above normal in Shansi and Shensi Provinces, including the upper reaches of the Yellow River; this is reflected in interruptions

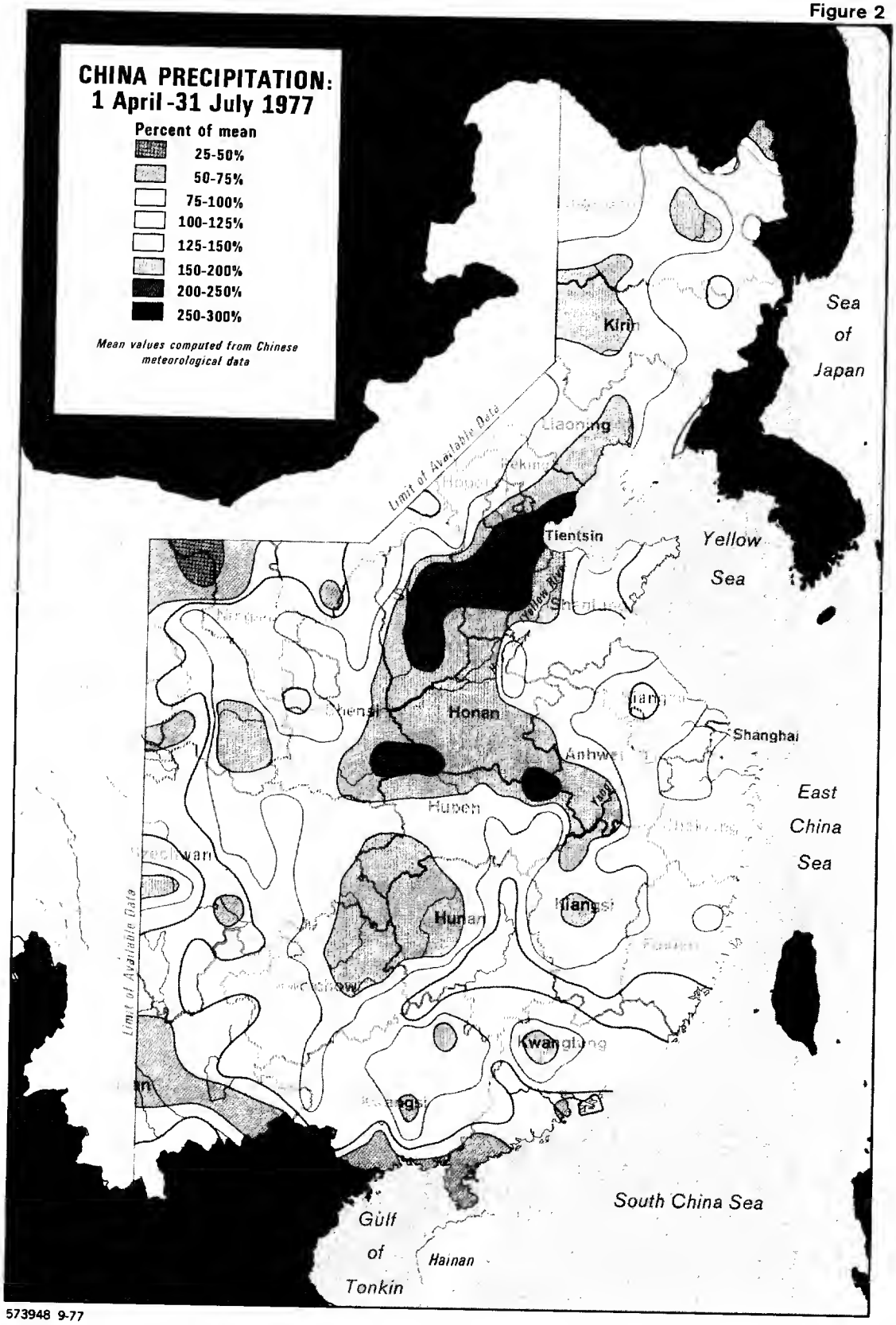
of rail service between Hopeh and Shansi and between Shansi and Shensi in late July and early August. Furthermore, a press report on 26 August reported that 1 million persons were doing flood prevention work along the Yellow River in Honan and Shantung Provinces; normally, such work would be performed during the slack season later in the year. A later press report claimed that the people of east-central Shansi overcame a serious natural disaster -- strong winds, hailstorms, heavy rainfalls, and mountain torrents -- but were concerned about the harvest. 25X1D

Elsewhere -- in northern Hunan and Kiangsi and in Hupeh, Anhwei, and Kiangsu Provinces -- some flooding [redacted] 25X1D [redacted] along the Yangtze River; many fields had been harvested and replanted. Earlier, concern was expressed by a local 25X1C resident [redacted] in mid-July that there had been heavy rain in southwestern Kiangsu Province immediately south of the Yangtze River, and that floods had become a distinct possibility; preventive measures were being taken because the Yangtze River had reached a dangerous level. Above-normal precipitation continued to fall along the Yangtze in August; and the Chinese press reported "extraordinary torrential rains, rarely seen in local history," in Shanghai on 21 and 22 August associated with a tropical depression that skirted the East China coast.

Favorable crop conditions [redacted] in eastern 25X1D Szechwan, where near normal precipitation was received in August. 25X1C No [redacted] reports were available for Szechwan during August.

In southern Kwangtung Province, below-normal precipitation during August appears to have had little adverse effect on the second rice crop. A 17 August Chinese press report discussed the "serious extent" of plant disease and insect pests in Kwangtung. Generally wet conditions prevailed in northern Kwangtung during late June and most of July; earlier, rice borer infestations were reported in neighboring Fukien Province and insect pests in the early rice crop in Kwangtung.

Figure 2



Heilungkiang Province
LANDSAT II Imagery
12 August 1976

Figure 3A

Low infra-red reflectance levels (orange and brown colors) in August of last year show crop conditions during drought.

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Increased
growing c
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Figure 3

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Figure 3B

! infra-red reflectance levels show improved crop onditions this July. Dark blue-black colors indicate ere water is beginning to accumulate.

7 August 1977

Figure 3C

Well above normal rains fell on Northeast China this summer; flooding along water courses has caused some losses of crops in low-lying areas. Flooded areas appear as a dark blue-black color. The above normal precipitation during this crop season alleviated the two-year drought and resulted in growing conditions greatly improved over those observed in August 1976.

Tientsin Municipality and Hopeh Province
LANDSAT II Imagery, August 15, 1976

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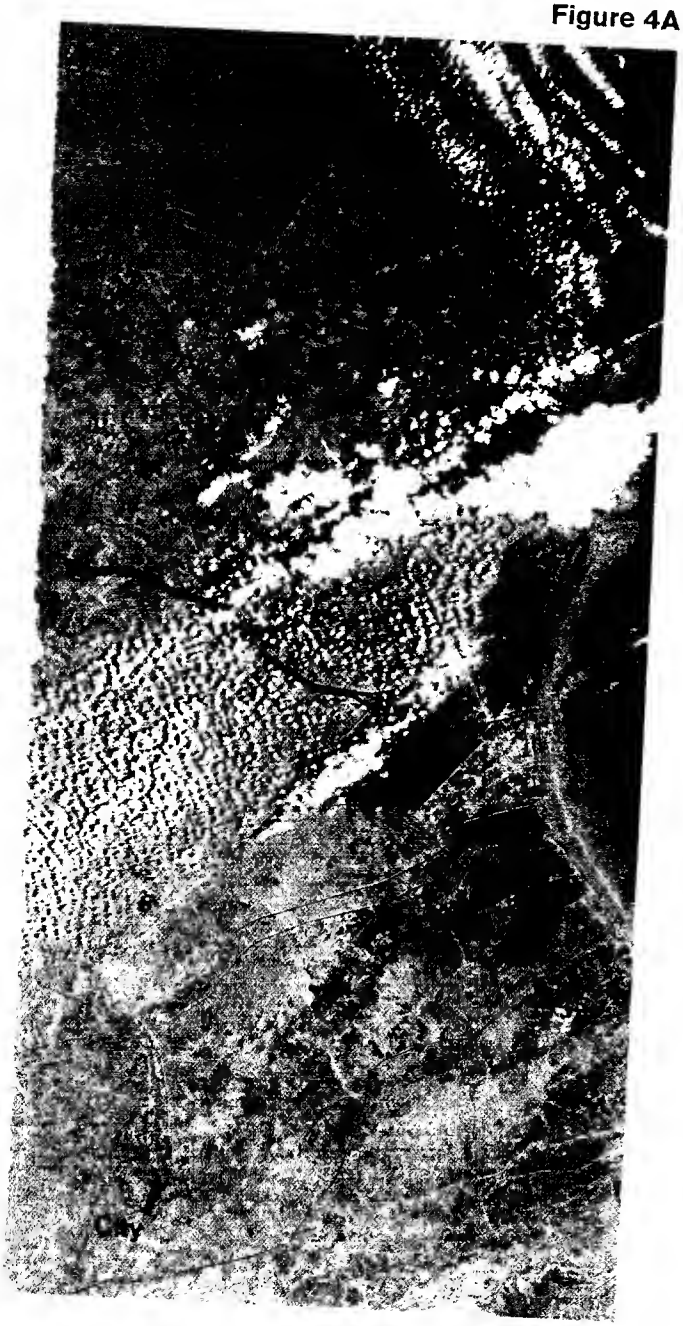
Figure 4A

LANDSAT II Imagery, A



Extensive areas with excessive mo
indicated by blue to dark blue colo
color–similar to that reflected by ci
growing conditions may be misleac
kilometers (180 km. x 180 km.).

ugust 10, 1977

Figure 4

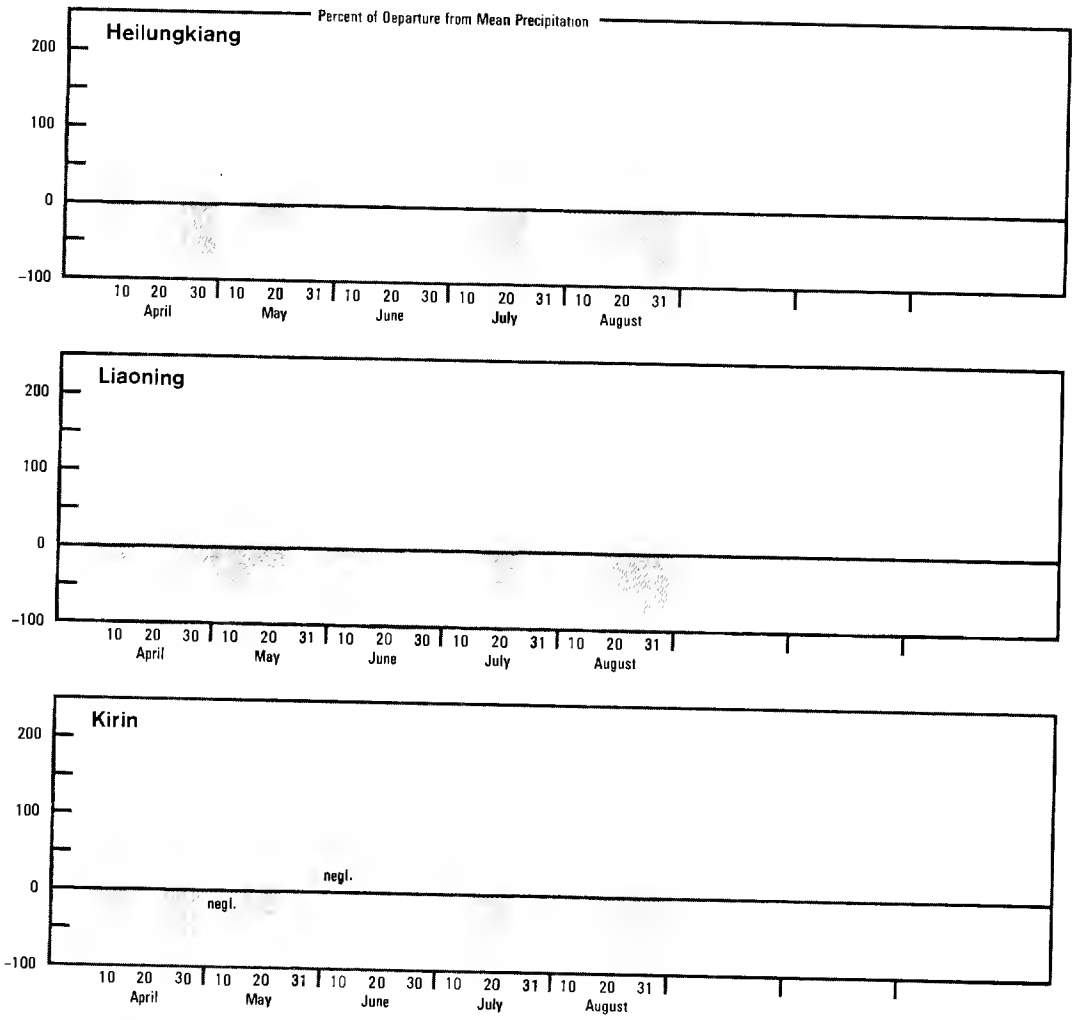
Figure 4B

isture levels and flooding are located within the dashed lines on Figure 4B. The extent of flooding, rs, is evident when compared to the same areas in mid-August 1976 (Figure 4A); a bluish-gray ities– indicates areas with excessive water levels. Infra-red reflectance as an indicator of good ling in these waterlogged areas. Each image depicts an area of approximately 32,000 square

Precipitation Variations from Mean:

Figure 5A

Northeast China Provinces



Mean values computed from Chinese meteorological data.

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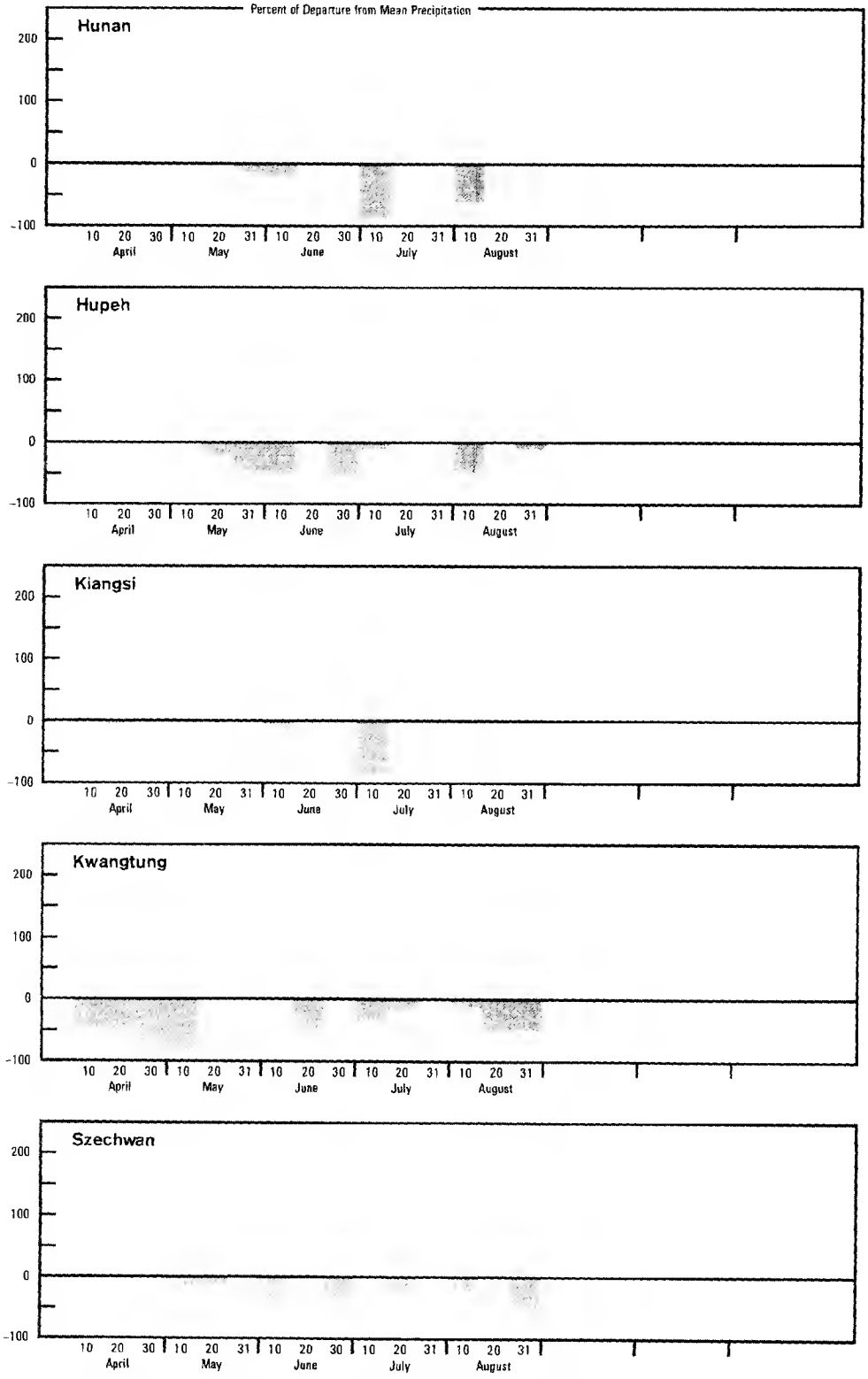
Precipitation Variations from Mean:

Figure 5B

Selected Major Rice Growing Provinces



Mean values computed from Chinese meteorological data.

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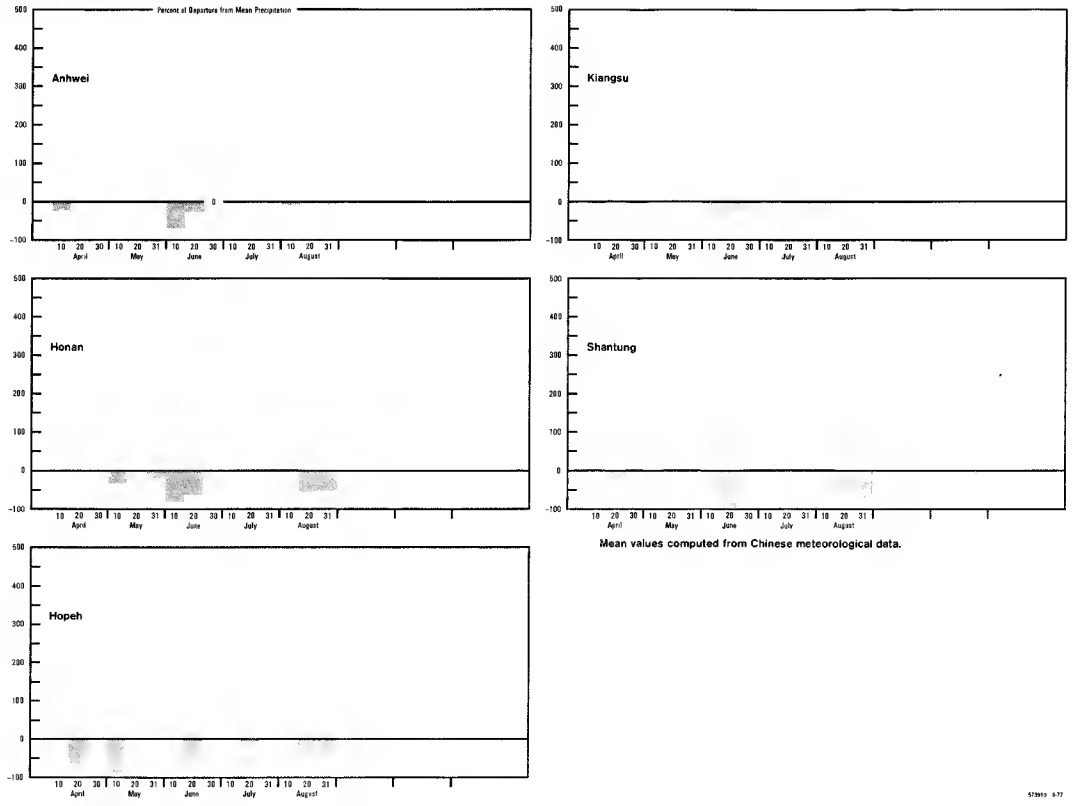
Figure 5C

Precipitation Variations from Mean
Provinces of the North China Plain



Mean values computed from Chinese meteorological data.

APPENDIX A-1

Selected Precipitation Data

Percent of Mean
Monthly Precipitation
1977

Province	April	May	June	July	August
Anhwei	153.3	163.4	68.0	180.3	104.7
Chekiang	129.6	159.8	114.0	94.0	116.2
Fukien	76.0	120.7	136.5	90.3	76.9
Heilungkiang	94.3	164.1	132.8	119.9	52.6
Honan	191.0	88.9	84.9	207.2	75.4
Hopeh	157.9	259.4	199.7	180.6	93.8
Hunan	134.0	113.4	158.0	119.3	116.8
Hupeh	177.6	144.0	81.0	179.9	100.4
Kiangsi	127.2	143.4	131.4	165.3	144.5
Kiangsu	149.3	153.8	49.2	133.0	96.9
Kirin	66.3	159.9	141.9	109.4	65.0
Kwangsi	74.9	127.4	150.7	126.9	94.4
Kwangtung	42.2	133.1	112.3	95.7	62.4
Kweichow	137.6	151.0	132.4	119.6	106.9
Liaoning	123.9	103.1	136.6	148.7	60.0
Shansi	183.0	157.6	182.5	157.7	124.3
Shantung	132.1	136.4	74.4	172.3	91.3
Shensi	144.4	94.6	84.0	147.5	85.7
Szechwan	136.1	98.5	84.0	153.9	80.7
Yunan	110.8	59.8	74.4	113.2	64.6

Values computed from Chinese meteorological data.

APPENDIX A-2

Selected Precipitation Data

Total
Monthly Precipitation
1977
(in millimeters)

Province	April	May	June	July	August
Anhwei	134.4	162.6	108.9	242.5	134.5
Chekiang	167.7	251.8	273.7	125.0	177.7
Fukien	122.8	291.8	371.2	161.7	131.8
Heilungkiang	21.8	78.2	120.9	173.1	57.4
Honan	78.9	54.0	55.6	293.1	94.7
Hopeh	21.0	75.3	116.0	285.2	130.2
Hunan	205.2	227.0	332.6	170.7	158.8
Hupeh	172.4	168.5	121.5	267.5	126.7
Kiangsi	264.4	340.8	358.5	194.3	178.2
Kiangsu	88.8	108.5	62.9	218.5	127.2
Kirin	16.3	66.5	134.1	157.5	83.3
Kwangsi	96.2	283.5	385.6	287.7	196.9
Kwangtung	62.8	322.2	307.2	255.6	154.3
Kweichow	135.4	246.1	263.0	207.7	159.1
Liaoning	32.3	57.0	108.4	261.0	96.8
Shansi	39.8	51.3	86.7	182.3	131.6
Shantung	33.4	51.4	53.0	240.9	126.1
Shensi	41.3	44.7	47.4	141.6	91.8
Szechwan	94.9	107.3	122.0	282.5	133.9
Yunnan	44.3	78.9	159.3	262.6	143.8

Values computed from Chinese meteorological data.

APPENDIX B-1

Selected Temperature Data
(Celsius)

Departure from Historical
Mean Monthly Temperature
1977

Province	April	May	June	July	August
Anhwei	0.7	-1.8	-0.8	-1.0	-2.2
Chekiang	0.8	-1.0	-1.6	-0.3	-2.5
Fukien	0.1	0.6	-1.1	-0.8	-1.9
Heilungkiang	-0.8	1.9	-1.4	0.0	-1.4
Honan	1.3	-1.0	0.7	-0.3	-0.8
Hopeh	0.9	-0.8	-0.7	-0.6	-0.7
Hunan	1.4	-1.2	-1.8	-0.5	-1.4
Hupeh	1.5	-1.0	-0.3	0.5	-0.4
Kiangsi	-0.1	-0.5	-2.0	-1.2	-1.8
Kiangsu	1.3	-1.8	-0.3	-0.2	-1.5
Kirin	0.3	1.6	-0.6	0.7	-0.5
Kwangsi	0.5	-0.2	-1.0	-0.7	-0.9
Kwangtung	0.6	1.2	0.2	-0.4	-0.3
Kweichow	-1.6	-1.6	-2.2	-1.4	-2.4
Liaoning	0.0	-0.6	-1.9	-0.3	-1.8
Shansi	0.6	-1.0	-1.0	-1.2	-0.8
Shantung	1.6	-1.4	0.6	0.6	-1.1
Shensi	0.0	-1.6	-1.6	-1.8	-0.6
Szechwan	-1.2	-1.4	-1.3	-1.4	-1.4
Yunnan	-0.3	1.2	1.0	0.9	0.0

Values computed from Chinese meteorological data.

APPENDIX B-2

Selected Temperature Data
(Celsius)

Mean Monthly Temperature
1977

Province	April	May	June	July	August
Anhwei	16.0	18.8	24.7	28.1	26.0
Chekiang	17.2	20.3	23.8	28.9	27.0
Fukien	19.9	23.9	25.4	28.5	27.6
Heilungkiang	4.2	14.6	17.7	22.3	19.3
Honan	14.6	17.1	23.4	25.0	23.4
Hopeh	13.0	17.1	21.8	24.2	22.6
Hunan	18.1	20.4	24.3	28.8	27.5
Hupeh	16.6	18.9	24.6	27.6	26.1
Kiangsi	17.7	20.9	24.0	28.5	26.8
Kiangsu	14.4	17.0	22.8	27.0	25.0
Kirin	6.3	14.7	17.5	22.1	19.2
Kwangsi	22.0	25.6	26.7	27.9	27.7
Kwangtung	23.1	26.9	27.9	28.7	28.6
Kweichow	17.1	19.5	21.9	24.7	23.6
Liaoning	9.5	16.5	20.3	24.5	21.7
Shansi	12.6	17.7	20.9	22.8	21.3
Shantung	14.4	17.7	24.2	27.0	24.7
Shensi	12.2	15.6	20.6	22.8	21.7
Szechwan	16.5	19.3	23.0	25.7	25.2
Yunnan	17.7	21.0	22.2	22.1	21.4

Values computed from Chinese meteorological data.

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